Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

Damage control resuscitation in patients with severe traumatic hemorrhage: a practice management guideline from the Eastern Association for the Surgery of Trauma.

Bibliographic Source(s)

Cannon JW, Khan MA, Raja AS, Cohen MJ, Como JJ, Cotton BA, Dubose JJ, Fox EE, Inaba K, Rodriguez CJ, Holcomb JB, Duchesne JC. Damage control resuscitation in patients with severe traumatic hemorrhage: a practice management guideline from the Eastern Association for the Surgery of Trauma. J Trauma Acute Care Surg. 2017 Mar;82(3):605-17. [96 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

NEATS Assessment

National Guideline Clearinghouse (NGC) has assessed this guideline's adherence to standards of trustworthiness, derived from the Institute of Medicine's report Clinical Practice Guidelines We Can Trust.

= Poor = Fair = Good = Very Good = Excellent

Assessment	Standard of Trustworthiness
YES	Disclosure of Guideline Funding Source
	Disclosure and Management of Financial Conflict of Interests
	Guideline Development Group Composition
YES	Multidisciplinary Group

YES	Methodologist Involvement
▮▯▯▯▯	Patient and Public Perspectives
	Use of a Systematic Review of Evidence
▮▮▮▮▯	Search Strategy
▮▮▮▮▮	Study Selection
▮▮▮▮▯	Synthesis of Evidence
	Evidence Foundations for and Rating Strength of Recommendations
▮▮▮▮▮	Grading the Quality or Strength of Evidence
▮▮▮▮▮	Benefits and Harms of Recommendations
▮▮▮▮▮	Evidence Summary Supporting Recommendations
▮▮▮▮▯	Rating the Strength of Recommendations
▮▮▮▮▯	Specific and Unambiguous Articulation of Recommendations
▮▮▯▯▯	External Review
▮▯▯▯▯	Updating

Recommendations

Major Recommendations

The strength of recommendation (strong or weak/conditional) and levels of evidence (high, moderate, low or very low) are defined at the end of the "Major Recommendations" field. Refer to the original guideline document for grading of the evidence quality.

Results for Massive Transfusion (MT)/Damage Control Resuscitation (DCR) Protocol Use (Population, Intervention, Comparator, and Outcome [PICO] 1)

In adult patients with severe trauma, should an MT/DCR protocol versus no MT/DCR protocol be used to decrease mortality or total blood products used?

Recommendation

In formulating a recommendation for the implementation of PICO 1, the guideline authors considered that many patients with hemorrhage presenting to a trauma center would place a high value on a rapid and well-coordinated resuscitation effort focused on arresting hemorrhage, reversing shock, and preventing coagulopathy. The risks of applying an MT/DCR protocol seem to be low, and use of an MT/DCR protocol is associated with a significant survival benefit. Based on this evidence, eight authors (73%) voted for a strong recommendation, while three (27%) voted for a conditional recommendation. Thus, the guideline authors recommend the development and implementation of an MT/DCR protocol for the management of severely injured trauma patients. This should be done with multidisciplinary input using the most current

evidence to guide indications for protocol activation (Callcut et al., 2013), the target blood product ratios implicit within the protocol, and the many other aspects of MT/DCR protocol implementation (Cotton et al., 2009).

Results for Plasma (PLAS):Red Blood Cells (RBC) and Platelets (PLT):RBC (PICO 2)

In adult patients with severe trauma, should a high ratio of PLAS:RBC and PLT:RBC versus a low ratio be administered to decrease mortality or total blood products used?

Recommendation

The guideline authors believe patients in hemorrhagic shock would value rapid reversal of this condition using the most effective resuscitation strategy available. Transfusion therapy for acute hemorrhage has become much safer than ever before with minimal risk of infectious disease transmission or adverse reaction. From a layperson's standpoint, treatment of hemorrhagic shock should involve the replacement of shed blood with products that functionally resemble what has been lost. Thus, the guideline authors believe most patients would value a high-ratio DCR strategy, if not whole blood (which remains Food and Drug Administration and American Association of Blood Banks [AABB] approved) (Kornblith et al., 2014; Spinella et al., 2009; Armand & Hess, 2003).

Based on the available evidence indicating a significant benefit to a high ratio of PLAS:RBC, nine members (82%) voted for a strong recommendation and two (18%) voted for a weak recommendation. Regarding a high ratio of PLT:RBC, eight (73%) voted for a strong recommendation, while three (27%) voted for a conditional recommendation. Thus, the guideline authors recommend targeting a high ratio of both PLAS and PLT:RBC for resuscitating severely injured bleeding trauma patients. Preparing MT packs or pre-positioning blood products in the trauma resuscitation bay in a 1:1:1 ratio (e.g., 6 units PLAS, 1 unit apheresis PLT, and 6 units RBC) can help avoid a significant ratio imbalance during the early empiric resuscitation phase. Additionally, leading with hemostatic PLAS and PLT early and then catching up with RBC in short order seems to be a safe guiding principle (del Junco et al., 2013), although further data are needed in this area.

Results for Recombinant Activated Factor VII (rVIIa) (PICO 3)

In adult patients with severe trauma, should the hemostatic adjunct rVIIa versus no rVIIa be administered to decrease mortality, total blood products used, or MT? Does use of rVIIa increase rates of venous thromboembolic events (VTEs)?

Recommendation

For most bleeding trauma patients, there does not seem to be a clear, significant mortality benefit from rVIIa. If given early in the resuscitation, rVIIa may decrease the need for a MT. Although there is also no evidence that rVIIa leads to more VTEs, this end point has not been well evaluated in the trauma population. One study in a mixed population of critically ill patients did demonstrate an increased rate of arterial thrombosis with rVIIa administration (Levi et al., 2010). Thus, the guideline authors believe most patients would want these agents given on a selective basis, reserved for those with significant hemorrhage and severe injuries.

The subcommittee was divided on the best recommendation based on this evidence. Four (36%) voted for a weak recommendation for rVIIa, while two (18%) voted against rVIIa (one weak and one strong) and five (45%) felt the data did not support any recommendation for or against rVIIa. Thus, the guideline authors cannot recommend for or against the use of rVIIa in the management of severely injured adult trauma patients. This adjunct does not seem to improve all-cause mortality across all patient populations, and its only demonstrated benefit is a possible reduced need for MT. The guideline authors feel that the use of rVIIa needs further study with particular attention to optimal dosing and the timing of rVIIa relative to blood product administration before a recommendation for or against its use can be made. Furthermore, VTE rates need to be more carefully evaluated with a defined surveillance protocol in future studies.

Results for Tranexamic Acid (TXA) (PICO 4)

In adult patients with severe trauma, should the hemostatic adjunct TXA versus no TXA be administered to decrease mortality, total blood products used, or MT? Does use of TXA increase rates of VTE?

Recommendation

The evidence for in-hospital use of TXA demonstrates a mortality benefit in a mixed population of questionably bleeding trauma patients in one international randomized controlled trial (RCT) (CRASH-2 trial collaborators et al., 2010), on subgroup analysis of a prospectively studied group of severely injured civilian patients in shock (Cole et al., 2015), and on retrospective review of severely injured combat casualties (Morrison et al., 2012; Morrison et al., 2013). When these results are combined, there is no clear universal mortality benefit to TXA; however, the safety profile of this medication seems to be favorable when used early after injury (i.e., within 3 hours). Seven subcommittee members (64%) supported a conditional recommendation for TXA use, while one (9%) favored a strong recommendation and three (27%) felt that a recommendation could not be made for or against TXA use. Thus, the guideline authors conditionally recommend TXA use as a hemostatic adjunct in the management of severely injured adult trauma patients. These recommendations apply only to the use of TXA in a hospital setting pending the results of two ongoing prehospital TXA trials. As with other hemostatic agents, VTE rates need to be more carefully evaluated with the use of a defined surveillance protocol in future studies on TXA.

Definitions

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Methodology Levels for Rating the Quality of Evidence

Quality Level	Definitions
High	Very confident that the true effect lies close to estimate of effect
Moderate	Moderate effect; true effect is likely close to estimate of effect but may be substantially different
Low	Limited confidence; true effect may be substantially different from estimate of effect
Very Low	Little confidence; true effect likely substantially different from estimate of effect

GRADE Definition of Strong and Weak Recommendation

	Strong Recommendation	Weak/Conditional Recommendation
For patients	Most patients would want the recommended course of action.	Most patients would want the recommended course of action, but many would not.
For clinicians	Most patients should receive the recommended course of action.	Different choices will exist for different patients, and clinicians should help patients decide.
For policy makers	Recommended course should be adopted as policy.	Considerable debate and stakeholder involvement needed to make policy.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Disease/Condition(s)

Severe traumatic hemorrhage

Guideline Category

Management

Treatment

Clinical Specialty

Critical Care

Emergency Medicine

Surgery

Intended Users

Physicians

Guideline Objective(s)

To evaluate key components of damage control resuscitation (DCR), including the role of massive transfusion (MT) or DCR protocols, the ratio of plasma (PLAS) and platelets (PLT) to red blood cells (RBC), and the role of hemostatic adjuncts such as recombinant activated factor VII (rVIIa) and tranexamic acid (TXA) in the management of severely injured bleeding patients

Target Population

Adult patients with severe trauma

Interventions and Practices Considered

1. Massive transfusion/damage control resuscitation (MT/DCR) protocol versus no MT/DCR protocol
2. High ratio of plasma and platelets to red blood cells (RBCs) versus a low ratio
3. Recombinant activated factor VII (rVIIa) versus no rVIIa (no recommendation made)
4. Tranexamic acid (TXA) versus no TXA

Major Outcomes Considered

- Mortality
- Intensive care unit length of stay
- Hospital length of stay
- Total blood products used
- Need for massive transfusion
- Specific complications including multisystem organ failure, venous thromboembolism (VTE) (including deep venous thrombosis and pulmonary embolism), and transfusion reactions

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Identification of References

A systematic review of the medical literature was performed using the PubMed, MEDLINE, and EMBASE databases to identify English-language human studies published from January 1985 through December 2015 using the medical subject heading (MeSH) terms and keywords listed (see table in Supplemental Digital Content 1 [see the "Availability of Companion Documents" field]). All studies of adult patients including randomized controlled trials (RCTs), observational studies, and retrospective studies were considered. Severely injured patients at risk of death from hemorrhage were defined as patients requiring blood transfusion and/or injury severity score greater than 25. The literature search was conducted by two authors who then performed title and abstract review to exclude articles in languages other than English, case reports, and expert opinion. Four authors then performed full text review of the remaining articles.

Number of Source Documents

The search generated 1,386 articles. A total of 1,219 were excluded by title and abstract review, leaving 167 articles for full text review. Subsequently, another 130 were excluded, leaving 37 for analysis. Of these, six were used for qualitative analysis only, while 31 met criteria for quantitative analysis (see Figure 1 in the original guideline document).

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Methodology Levels for Rating the Quality of Evidence

Quality Level	Definitions
High	Very confident that the true effect lies close to estimate of effect.
Moderate	Moderate effect; true effect is likely close to estimate of effect but may be substantially different.
Low	Limited confidence; true effect may be substantially different from estimate of effect.
Very Low	Little confidence; true effect likely substantially different from estimate of effect.

Methods Used to Analyze the Evidence

Meta-Analysis

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Selection of Outcome Measures

Relevant outcomes were identified by four authors including mortality, intensive care unit length of stay, hospital length of stay, total blood products used, need for massive transfusion (MT), and specific complications including multisystem organ failure (MSOF), venous thromboembolic events (VTE) (including deep venous thrombosis and pulmonary embolism), and transfusion reactions. These outcomes were then scored from 1 (less important) to 9 (critically important) (see table in Supplemental Digital Content 2 [see the "Availability of Companion Documents" field]) and those with a score of 7 or greater were considered. For all Population, Intervention, Comparator, and Outcome (PICO) questions, mortality and total blood products used were deemed critical. For PICO 3 and 4, additional critical outcomes included need for MT and VTE events.

Data Extraction and Methodology

For PICO 1, a total of seven retrospective studies assessed the value of an MT or damage control resuscitation (DCR) protocol. One additional study did not define when the MT protocol (MTP) was implemented, while three others described modifications to an existing MT or DCR protocol. Consequently, these four studies were considered in the qualitative analysis only.

For PICO 2, the randomized prospective PROPPR study, two prospective, observational studies, and 12 retrospective studies evaluated plasma (PLAS):red blood cells (RBC) ratios. PROPPR and three retrospective studies evaluated platelets (PLT):RBC ratios. The PROMMTT study used a time-varying analysis that was not conducive to meta-analysis; so it was used for qualitative analysis along with one other study on PLT transfusion.

Hemostatic adjuncts that have been adequately studied for the purposes of this practice management guideline (PMG) include recombinant activated factor VII (rVIIa) and tranexamic acid (TXA). While there is increasing interest in the use of prothrombin complex concentrate, fibrinogen concentrate, and desmopressin in managing acutely bleeding trauma patients, there is currently insufficient evidence to systematically evaluate their use. For PICO 3, two randomized, prospective, placebo-controlled studies and three retrospective studies met inclusion criteria. For PICO 4, tranexamic acid was the subject of a large, randomized, prospective, placebo-controlled international trial (CRASH-2) that was included in the analysis. One additional prospective study and the two retrospective Military Application of Tranexamic Acid in Trauma Emergency Resuscitation (MATTERs and MATTERs II) studies were also included. While these military studies contained overlapping patients, only MATTERs reported rates of venous thromboembolic events (VTE), a critical outcome. Thus, MATTERs II was used to assess mortality, blood product use, and MT, while MATTERs was used to evaluate VTE.

One author entered data from each study into Review Manager (RevMan, Cochrane Collaboration, version 5.2) for quantitative analysis. Forest plots were generated for each critical outcome after calculating the random effects relative risk for categorical variables and mean difference for the one continuous variable (blood product use). Mortality was taken as 28-day, 30-day, or hospital mortality according to each study. Detailed blood product use was infrequently reported, although many studies consistently reported units of RBC given in 24 hours. Thus, this was used as a surrogate end point for total blood products. Because RevMan uses mean difference, when a median value was reported, a normal distribution was assumed.

Evidence profiles were generated for each PICO using GRADEpro GDT (GRADEpro Guideline Development Tool, McMaster University, 2015, available at gradepro.org). The guideline authors considered study methodology as well as the domains of study bias, inconsistency, indirectness, imprecision, and publication bias when rating the quality of evidence as high, moderate, low, or very low using established methods used by GRADE. Implicit consideration was given to the risks and benefits of each intervention along with the most likely values and preferences of patients the guideline authors have collectively managed in these life-threatening situations. All members of the subcommittee voted on the proposed recommendations for each PICO using Survey Monkey (www. surveymonkey.com) or RedCap electronic data capture tools hosted at the University of Pennsylvania.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology, the guideline authors defined four population (P), intervention (I), comparator (C), and outcome (O) (PICO) questions:

> PICO Question 1: In adult patients with severe trauma (P), should a massive transfusion (MT)/damage control resuscitation (DCR) protocol (I) versus no MT/DCR protocol (C) be used to decrease mortality or total blood products used (O)?
> PICO Question 2: In adult patients with severe trauma (P), should a high ratio of plasma (PLAS) and platelets (PLT) to red blood cells (RBC) (I) versus a low ratio (C) be administered to decrease mortality or total blood products (O)?
> PICO Question 3: In adult patients with severe trauma (P), should recombinant activated factor VII (rVIIa) (I) versus no rVIIa (C) be administered to decrease mortality, total blood products used, or MT? Does use of rVIIa increase rates of venous thromboembolic events (VTEs) (O)?
> PICO Question 4: In adult patients with severe trauma (P), should tranexamic acid (TXA) (I) versus no TXA (C) be administered to decrease mortality, total blood products used, or MT? Does use of TXA increase rates of venous thromboembolic events (VTE) (O)?

Rating Scheme for the Strength of the Recommendations

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Definition of Strong and Weak Recommendation

	Strong Recommendation	Weak/Conditional Recommendation
For patients	Most patients would want the recommended course of action.	Most patients would want the recommended course of action, but many would not.
For clinicians	Most patients should receive the recommended course of action.	Different choices will exist for different patients, and clinicians should help patients decide.
For policy makers	Recommended course should be adopted as policy.	Considerable debate and stakeholder involvement needed to make policy.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Not stated

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

References Supporting the Recommendations

Armand R, Hess JR. Treating coagulopathy in trauma patients. Transfus Med Rev. 2003 Jul;17(3):223-31. PubMed

Callcut RA, Cotton BA, Muskat P, Fox EE, Wade CE, Holcomb JB, Schreiber MA, Rahbar MH, Cohen MJ, Knudson MM, Brasel KJ, Bulger EM, Del Junco DJ, Myers JG, Alarcon LH, Robinson BR, PROMMTT Study Group. Defining when to initiate massive transfusion: a validation study of individual massive transfusion triggers in PROMMTT patients. J Trauma Acute Care Surg. 2013 Jan;74(1):59-65, 67-8; discussion 66-7. PubMed

Cole E, Davenport R, Willett K, Brohi K. Tranexamic acid use in severely injured civilian patients and the effects on outcomes: a prospective cohort study. Ann Surg. 2015 Feb;261(2):390-4. PubMed

Cotton BA, Dossett LA, Au BK, Nunez TC, Robertson AM, Young PP. Room for (performance) improvement: provider-related factors associated with poor outcomes in massive transfusion. J Trauma. 2009 Nov;67(5):1004-12. PubMed

CRASH-2 trial collaborators, Shakur H, Roberts I, Bautista R, Caballero J, Coats T, Dewan Y, El-Sayed H, Gogichaishvili T, Gupta S, Herrera J, Hunt B, Iribhogbe P, Izurieta M, Khamis H, Komolafe E, Marrero MA, MejÃa-Mantilla J, Miranda J, Morales C, Olaomi O, Olldashi F, Perel P, Peto R, Ramana PV, Ravi RR, Yutthakasemsunt S. Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomised, placebo-controlled trial. Lancet. 2010 Jul 03;376(9734):23-32. PubMed

del Junco DJ, Holcomb JB, Fox EE, Brasel KJ, Phelan HA, Bulger EM, Schreiber MA, Muskat P, Alarcon LH, Cohen MJ, Cotton BA, Wade CE, Myers JG, Rahbar MH, PROMMTT Study Group. Resuscitate early with plasma and platelets or balance blood products gradually: findings from the PROMMTT study. J Trauma Acute Care Surg. 2013 Jul;75(1 Suppl 1):S24-30. PubMed

Kornblith LZ, Howard BM, Cheung CK, Dayter Y, Pandey S, Busch MP, Pati S, Callcut RA, Vilardi RF, Redick BJ, Nelson MF, Cohen MJ. The whole is greater than the sum of its parts: hemostatic profiles of whole blood variants. J Trauma Acute Care Surg. 2014 Dec;77(6):818-27. PubMed

Levi M, Levy JH, Andersen HF, Truloff D. Safety of recombinant activated factor VII in randomized clinical trials. N Engl J Med. 2010 Nov 04;363(19):1791-800. PubMed

Morrison JJ, Dubose JJ, Rasmussen TE, Midwinter MJ. Military Application of Tranexamic Acid in Trauma Emergency Resuscitation (MATTERs) Study. Arch Surg. 2012 Feb;147(2):113-9. PubMed

Morrison JJ, Ross JD, Dubose JJ, Jansen JO, Midwinter MJ, Rasmussen TE. Association of cryoprecipitate and tranexamic acid with improved survival following wartime injury: findings from the MATTERs II Study. JAMA Surg. 2013 Mar;148(3):218-25. PubMed

Spinella PC, Perkins JG, Grathwohl KW, Beekley AC, Holcomb JB. Warm fresh whole blood is independently associated with improved survival for patients with combat-related traumatic injuries. J Trauma. 2009 Apr;66(4 Suppl):S69-76. PubMed

Type of Evidence Supporting the Recommendations

The type of evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Based on this focused analysis, there is compelling evidence that a well-planned massive transfusion (MT)/damage control resuscitation (DCR) protocol will improve survival without increasing blood product usage. A high ratio of plasma (PLAS) and platelet (PLT) to red blood cells (RBC) reduces hemorrhage-related mortality and likely also reduces all-cause mortality, a finding consistent with previous systematic reviews and published guidelines. These benefits may be further augmented by the early in-hospital use of acid (TXA) in severely injured bleeding patients.

Refer to the "Qualitative Synthesis" and "Quantitative Synthesis (Meta-analysis)" sections of the original guideline document for a discussion of evidence related to benefits of specific interventions.

Potential Harms

The one military paper found for population (P), intervention (I), comparator (C), and outcome (O) question 1 demonstrated increased use of blood products, particularly plasma (PLAS), platelets (PLT), and cryoprecipitate; however, massive transfusion protocol (MTP) use resulted in earlier physiologic recovery.

Refer to the "Qualitative Synthesis" and "Quantitative Synthesis (Meta-analysis)" sections of the original guideline document for a discussion of evidence related to harms of specific interventions.

Qualifying Statements

Qualifying Statements

- The Eastern Association for the Surgery of Trauma (EAST) is a multi-disciplinary professional society committed to improving the care of injured patients. The Ad Hoc Committee for Practice Management Guideline Development of EAST develops and disseminates evidence-based information to increase the scientific knowledge needed to enhance patient and clinical decision-making, improve health care quality, and promote efficiency in the organization of public and private systems of health care delivery. Unless specifically stated otherwise, the opinions expressed and statements made in this publication reflect the authors' personal observations and do not imply endorsement by nor official policy of EAST.
- "Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances."* These guidelines are not fixed protocols that must be followed, but are intended for health care professionals and providers to consider. While they identify and describe generally recommended courses of intervention, they are not presented as a substitute for the advice of a physician or other knowledgeable health care professional or provider. Individual patients may require different treatments from those specified in a given guideline. Guidelines are not entirely inclusive or exclusive of all methods of reasonable care that can obtain/produce the same results. While guidelines can be written that take into account variations in clinical settings, resources, or common patient characteristics, they cannot address the unique needs of each patient nor the combination of resources available to a particular community or health care professional or provider. Deviations from clinical practice guidelines may be justified by individual circumstances. Thus, guidelines must be applied based on individual patient needs using professional judgment.
- The recommendations in this practice management guideline (PMG) are the result of a

comprehensive and systematic analysis of the literature on several aspects of the damage control resuscitation (DCR) paradigm. Although the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach attempts to overcome some limitations of a meta-analysis with a transparent qualitative assessment and evidence evaluation process, these recommendations should not replace clinical judgment.

*Institute of Medicine. Clinical practice guidelines: directions for a new program. MJ Field and KN Lohr (eds) Washington, DC: National Academy Press. 1990: pg 39.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Staff Training/Competency Material

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Cannon JW, Khan MA, Raja AS, Cohen MJ, Como JJ, Cotton BA, Dubose JJ, Fox EE, Inaba K, Rodriguez CJ, Holcomb JB, Duchesne JC. Damage control resuscitation in patients with severe traumatic hemorrhage: a practice management guideline from the Eastern Association for the Surgery of Trauma. J Trauma Acute Care Surg. 2017 Mar;82(3):605-17. [96 references] PubMed

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2017 Mar

Guideline Developer(s)

Eastern Association for the Surgery of Trauma - Professional Association

Source(s) of Funding

Eastern Association for the Surgery of Trauma (EAST)

Guideline Committee

Subcommittee of the Eastern Association for the Surgery of Trauma (EAST) Practice Management Guidelines (PMG) Section

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

The authors declare no conflicts of interest.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the Journal of Trauma and Acute Care Surgery Web site .

Availability of Companion Documents

The following are available:

Kerwin AJ, Haut ER, Burns JB, Como JJ, Haider A, Stassen N, Dahm P, Eastern Association for the Surgery of Trauma Practice Management Guidelines Ad Hoc Committee. The Eastern Association of the Surgery of Trauma approach to practice management guideline development using Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology. J Trauma Acute Care Surg. 2012 Nov;73(5 Suppl 4):S283-7. Available from the Eastern Association for the Surgery of Trauma (EAST) Web site .

A continuing medical education (CME) activity for this guideline is available in the original guideline document .

Supplemental digital content is available from the Journal of Trauma and Acute Care Surgery Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on May 9, 2017. The information was verified by the guideline developer on May 22, 2017.

This NEATS assessment was completed by ECRI Institute on June 22, 2017. The information was verified by the guideline developer on July 26, 2017.

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